

**PRELIMINARY AMENDMENT****PAGE 2**

Serial No.: 10/628,195

Filing Date: July 28, 2003

Attorney Docket No. 125.071US01

Title: LINE MODELING TOOL

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**Amendments to the Claims:**

This listing of claims will replace all prior versions and listings of claims in the application:

**Listing of claims:**

- 1.(Original) A method of simulating interconnect lines in an electronic design automation simulation, the method comprising:
  - partitioning the interconnect lines into groups of interconnect lines, wherein each group of interconnect lines does not have interactions with any of the other groups of interconnect lines and wherein at least one of the groups of interconnect lines contains at least three interconnect lines; and
  - modeling the interconnect lines in each group, wherein the modeling includes at least one of modeling mutual inductances and modeling of mutual capacitances.
2. (Original) The method of claim 1, further comprising:
  - shielding at least one of the lines in a group of interconnect lines with a metal shield.
3. (Original) The method of claim 2, wherein the metal shield is a patterned metal shield.
4. (Original) The method of claim 2, further comprising:
  - coupling at least one of the other lines in the group of interconnect lines to the metal shield.
5. (Original) The method of claim 1, wherein modeling the interconnect lines in each group further comprises:
  - providing data defining parameters of the interconnect lines in the group; and
  - determining model data based at least in part on the data defining the parameters.

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6. (Original) The method of claim 5, wherein providing the data defining the parameters of the interconnect lines in the group further comprises:

inputting the data defining parameters through a component description format window.

7. (Original) The method of claim 5, further comprising:

displaying the modeling results of the interconnect lines upon the entering of the data defining parameters, wherein the data defining parameters can be edited to achieve a desired model of the interconnect lines.

8. (Original) The method of claim 5, wherein defining parameters include the frequencies of each interconnect line in a group.

9. (Original) The method of claim 8, wherein the frequencies for each interconnect line is defined separately.

10. (Original) The method of claim 1, further comprising:

assigning a unique identification tag to each model group of interconnect lines.

11. (Original) The method of claim 10, wherein each unique identification tag is assigned automatically upon the creation of an associated model group of interconnect lines.

12. (Original) A method of modeling an integrated circuit with a simulation program, the method comprising:

defining devices in the integrated circuit;

defining interconnect lines that electrically connect the devices;

grouping three or more interconnect lines into a plurality of separate linegroups, wherein at least one of the linegroups of interconnect lines contains at least three interconnect lines;

assigning a unique identification tag to each linegroup automatically for model generation and simulation identification upon the creation of the linegroup; and

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modeling the interconnect lines in each linegroup to determine the electromagnetic behavior of each of the linegroups, wherein the modeling occurs without a linegroup affecting the modeling of another of the linegroups.

13. (Original) The method of claim 12, wherein the electromagnetic behavior includes interactions between the interconnect lines within each line group.

14. (Original) The method of claim 12, further comprising:

compiling the results of the modeling in a form that allows a circuit design system to simulate it.

15. (Original) The method of claim 14, wherein the form is a lumped-element description of each linegroup including at least one of mutual inductance between two lines in a line group and capacitance between two lines in the linegroup.

16. (Original) The method of claim 12, wherein modeling the interconnect lines in each linegroup further comprises:

providing data defining parameters of the interconnect lines in the linegroup; and  
determining model data based at least in part on the defining parameters.

17. (Original) The method of claim 16, wherein providing the data defining the parameters of the interconnect lines in the linegroups further comprises:

inputting the data defining parameters through a component description format window.

18. (Original) The method of claim 16, further comprising:

displaying modeling results of the interconnect lines in each linegroup upon the entering of the data defining parameters, wherein the data defining parameters can be edited to achieve a desired model of the interconnect lines in a linegroup.

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19. (Original) The method of claim 18, wherein the defining parameters include independently settable frequencies for each interconnect line in a linegroup.
20. (Original) The method of claim 16, wherein the defining parameters include coordinates of a linegroup.
21. (Original) The method of claim 16, further comprising:  
entering linegroup coordinates with a keyboard.
22. (Original) The method of claim 16, further comprising:  
displaying a layout; and  
marking the layout to enter linegroup coordinates.
23. (Original) The method of claim 16, further comprising:  
displaying a schematic diagram.
24. (Original) The method of claim 23, further comprising:  
using placeholders in the schematic diagram to improve readability of the schematic.
25. (Original) The method of claim 23, wherein each linegroup is represented by a symbol in the schematic diagram.
26. (Original) The method of claim 25, wherein the symbol illustrates at least one terminal per associated interconnect line.
27. (Original) The method of claim 25, wherein the symbol illustrates 2 terminals that represent two ends of an interconnect line.
28. (Original) A computer-readable medium including instructions for simulating interconnect lines in an integrated circuit comprising:

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partitioning the interconnect lines into groups of interconnect lines, wherein each group of interconnect lines does not have interactions with any of the other groups of interconnect lines and wherein at least one group of the interconnect lines contains at least three interconnect lines and further wherein each group of interconnect lines is represented by a symbol in a schematic diagram; and

modeling the interconnect lines in each group, wherein the modeling includes at least one of modeling mutual inductances and modeling of line to line capacitances.

29. (Original) The computer-readable medium including instructions for simulating interconnect lines in an integrated circuit of claim 28, wherein modeling the interconnect lines in each group further comprises:

providing data defining parameters of the interconnect lines in the group; and  
determining model data based at least in part on the data defining the parameters.

30. (Original) The computer-readable medium including instructions for simulating interconnect lines in an integrated circuit of claim 29, wherein providing the data defining the parameters of the interconnect lines in the group further comprises:

inputting the data defining parameters into a component description format window.

31. (Original) The computer-readable medium including instructions for simulating interconnect lines in an integrated circuit of claim 29, further comprising:

displaying the modeling results of the interconnect lines upon the entering of the data defining parameters, wherein the data defining parameters can be edited to achieve a desired model of the interconnect lines.

32. (Original) The computer-readable medium including instructions for simulating interconnect lines in an integrated circuit of claim 29, wherein defining parameters include the frequencies of each interconnect line in a group.

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33. (Original) The computer-readable medium including instructions for simulating interconnect lines in an integrated circuit of claim 32, wherein the frequencies for each interconnect line are defined separately.

34. (Original) The computer-readable medium including instructions for simulating interconnect lines in an integrated circuit of claim 28, further comprising:

assigning a unique identification tag to each model group of interconnect lines.

35. (Original) The computer-readable medium including instructions for simulating interconnect lines in an integrated circuit of claim 34, wherein each unique identification tag is assigned automatically upon the creation of an associated model group of interconnect lines.

36. (Original) The computer-readable medium including instructions for simulating interconnect lines in an integrated circuit of claim 28, further comprising:

identifying and reading interconnect line models automatically into circuit netlist for simulation.

37. (Original) A method of simulating interconnect lines in an electronic design automation simulation, the method comprising:

partitioning the interconnect lines into groups of interconnect lines, wherein at least one of each group of interconnect lines has a select interaction with another of one of the groups of interconnect lines and further wherein at least one of the groups of interconnect lines contains at least three interconnect lines; and

modeling of interconnect lines, wherein the modeling includes substantially more modeling of mutual inductances and mutual capacitances within each group of interconnect lines than modeling of mutual inductances and capacitances between groups of interconnect lines.

38. (Original) The method of claim 37, further comprising:

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assigning a unique identification tag to each linegroup automatically for model generation and simulation identification upon the creation of the linegroup

39. (Original) The method of claim 37, wherein modeling the interconnect lines in each group further comprises:

providing data defining parameters of the interconnect lines in the group; and  
determining model data based at least in part on the data defining the parameters.

40. (Original) The method of claim 37, further comprising:

displaying the modeling results of the interconnect lines upon the entering of the data defining parameters, wherein the data defining parameters can be edited to achieve a desired model of the interconnect lines.

41. (New) A method of manufacturing an integrated circuit, the method comprising:

simulating interconnect lines in an electronic design automation simulation, the simulation including:

partitioning the interconnect lines into groups of interconnect lines, wherein each group of interconnect lines does not have interactions with any of the other groups of interconnect lines and wherein at least one of the groups of interconnect lines contains at least three interconnect lines, and

modeling the interconnect lines in each group, wherein the modeling includes at least one of modeling mutual inductances and modeling of mutual capacitances; and  
forming the integrated circuit with use of the simulation of the interconnect lines.

42. (New) The method of claim 41, wherein the integrated circuit is an RF circuit.

43. (New) The method of claim 41, wherein not all of the interconnect lines run at the same frequency.

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44. (New) The method of claim 41, wherein the integrated circuit includes a patterned ground shield.
45. (New) The method of claim 41, wherein the simulation further comprises:  
defining each device in the integrated circuit.
46. (New) A method of manufacturing an integrated circuit, the method comprising:  
modeling an integrated circuit with a simulation program, the modeling including,  
defining devices in the integrated circuit,  
defining interconnect lines that electrically connect the devices,  
grouping three or more interconnect lines into a plurality of separate linegroups,  
wherein at least one of the linegroups of interconnect lines contains at least three  
interconnect lines,  
assigning a unique identification tag to each linegroup automatically for model  
generation and simulation identification upon the creation of the linegroup, and  
modeling the interconnect lines in each linegroup to determine the  
electromagnetic behavior of each of the linegroups, wherein the modeling occurs without  
a linegroup affecting the modeling of another of the linegroups; and  
forming interconnect lines in the integrated circuit using the modeled interconnect lines.
47. (New) A method of manufacturing an integrated circuit, the method comprising:  
simulating interconnect lines in an electronic design automation simulation, the  
simulation including,  
partitioning the interconnect lines into groups of interconnect lines, wherein at  
least one of each group of interconnect lines has a select interaction with another of one  
of the groups of interconnect lines and further wherein at least one of the groups of  
interconnect lines contains at least three interconnect lines, and



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modeling of interconnect lines, wherein the modeling includes substantially more modeling of mutual inductances and mutual capacitances within each group of interconnect lines than modeling of mutual inductances and capacitances between groups of interconnect lines; and forming the integrated circuit using the simulation of the interconnect lines.